CARD READER FOR RECEIVING A CARD BEARING AN IMPRINTED DATA STRIP, SELF POSITIONING THE CARD IN A PRE-DETERMINED POSITION AND SCANNING THE IMPRINTED DATA STRIP IN TWO DIRECTIONS

FIELD OF THE INVENTION

This invention relates to readers for cards bearing bit-encoded data, i.e., data that is digitally-encoded in data strips on the face of the cards. The data is encoded on calling cards, credit cards, or the like by printing, thermal transfer, direct thermal, dot matrix, photography, or similar methods.

The amount of data that can be encoded by use of data strips exceeds that found in a bar code or a magnetic code occupying the same amount of space by at least an order of magnitude. Because of this, however, to obtain accurate readings, the data strip must be accurately aligned on the card, the card must be accurately aligned in the reader, and the reader must be capable of reading microscopic bits.

RELATED APPLICATIONS

Two patent applications, owned by a common assignee, are presently pending, the disclosures of which are incorporated in this application by reference. These are:

For the reader: Application Ser. No. 718,219, filed Apr. 1, 1985, now U.S. Pat. No. 4,692,603, issued Sept. 8, 1987, for Optical Reader For Printed Bit-Encoded Data and Method of Reading Same, herein the "reader application". For the data strip: Application Ser. No. 799062, filed Sept. 23, 1985, now U.S. Pat. No. 4,782,221, issued Nov. 1, 1988, for Printed Data Strip Including Bit-Encoded Information and Scanner Control.

BRIEF SUMMARY OF THE INVENTION

A card reader is provided for reading data strips carried on cards. The reader includes a housing with an input slot carrying a removable card alignment tray to receive the cards. Sensing means are located within the housing to detect the presence of a card and to control card-alignment driving mechanisms. The cards, once sensed, are drawn into the unit and forced into three-dimensional alignment for scanning. A detector senses when the card is in its aligned position and actuates an optical scanner to scan the data strip on the cards. Scanning is done through a transparent or open window to be certain that the plane of the card is properly aligned for scanning. When scanning is completed, the input mechanism is reversed to eject the card.

To assure proper alignment of the data strip relative to the scanner, (a) the scanner itself is positioned by a track, (b) the alignment tray (which holds the cards being read) has end and side alignment guides to position the card relative to the scanner, and (c) the data strip is in a known, predetermined position on the card.

The alignment tray can be removed and replaced with others having alignment guides in different positions. This allows the data strip to be printed in different positions upon the card and yet, by use of the proper tray, still be aligned with the scanner.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of a card having a data strip bearing bit-encoded data.

FIG. **2** is a perspective view of our reader showing a card being inserted into the input slot of the reader.

FIG. **3** is a front elevation showing the removable tray and the slot to receive a card.

FIG. **4** is a rear elevation showing the power switch and the electrical connections to the reader.

FIG. **5** is a partial front perspective view showing the alignment tray being inserted into the reader.

FIG. **6** is a perspective view of a modified form of alignment tray, shown upside down.

FIG. **7** is a top plan view of the inside of the reader showing the card-alignment mechanism.

FIG. **8** is a view similar to FIG. **7** except showing a card in place and showing the scanner on its tracks.

FIG. **9** is a transverse section on line **9—9** of FIG. **7**. showing a card in place within the reader and the optical scanner in scanning position over the card.

FIG. **10** is a bottom plan view, a view from underneath, showing details of the card-alignment mechanism.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** shows a typical card **1** bearing a data strip **3**. The data strip includes bit-encoded data. It is the same as the data strip disclosed in the data strip application. It includes a header to provide needed scanning information for the optical reader followed by a data portion including transverse lines of bit-encoded data.

A typical data strip, as used on a card of credit card size, might measure about 16 mm (⅝ inch) wide and 68 mm (2.5 inches) long. The maximum length on a card of this size is about 76 mm (3.0 inches). The encoded bits are generally rectangular and might measure 0.25 mm (0.010 inches) in each direction (This could vary, however, depending upon the desired density of encoding); and, for greater accuracy, data is recorded in dibit form. As a result, a typical card would carry some 1000 bytes of information.

Card **1** includes a leading edge **7** and a side edge **9**. Data strip **3** is located upon card **1** at a known, predetermined distance **8** from edge **7** and at a known predetermined distance **10** from edge **9**. Preferably, it is parallel to edge **9**. This exact positioning is necessary so that, when the card is properly aligned with the scanner, the data strip will be properly aligned for scanning.

Data strip **3** is put on card **1** in any desired manner, such as by printing or one of the methods suggested above.

The reader **15** is shown in FIGS. **2**, **3**, and **4**. Reader **15** includes a card aligning tray **17** which fits in position in a slot **18** in the end of the reader **15** and is held by guides within the reader. Slot **18** and the lower side of tray **17** together form a slot **19** to receive card **1**. (Note that in this preferred embodiment the card is positioned beneath tray **17**). The insertion of a tray **17** into slot **18** of reader **15** is shown in FIG. **5**.

Reader **15** also includes power switch **20** and the necessary electrical connections **21** to receive power and to transmit data from the data strip to a monitor, computer, or other type of receiver.

Details of the tray **17** and the structure for aligning card **1** for scanning are shown in FIGS. **6**, **7**, **8**, **9**, and **10**. Preferably, window **25** of the tray is molded of clear